

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-206563

(43)Date of publication of application : 13.08.1996

(51)Int.Cl.

B05C 5/00

(21)Application number : 07-327623

(71)Applicant : FUJI MACH MFG CO LTD

(22)Date of filing : 15.12.1995

(72)Inventor : ASAI KOUICHI

TSUDA MAMORU

OE KUNIO

IWATSUKI TAKAMOTO

(30)Priority

Priority number : 62213658 Priority date : 27.08.1987 Priority country : JP

(54) HIGH-VISCOSITY FLUID APPLICATOR

(57)Abstract:

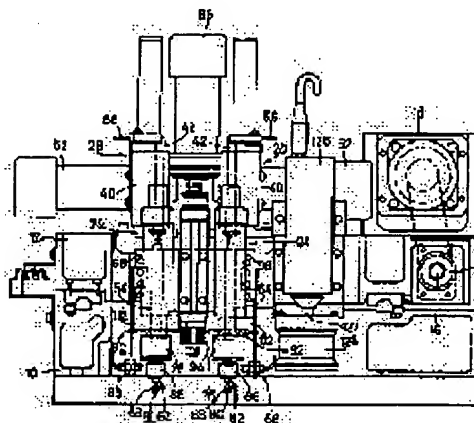
PURPOSE: To provide an adhesive applicator capable of exactly applying an adhesive for bonding electronic parts by an adequate amt. on printed circuit boards.

CONSTITUTION: A stopper 88 is so controlled as to come into contact with the printed circuit board earlier than a discharge pipe 80 and to exactly regulate the spacing between this discharge pipe 80 and the printed circuit board at the time of bringing the discharge pipe 80 in proximity to the printed circuit board supported in a printed circuit board positioning and supporting device.

The adhesive is discharged in this state from the discharge pipe 80 and is applied in a spot form at the prescribed position on the printed circuit board. The

image of this spotty adhesive is picked up from a

direction perpendicular to the printed circuit board by a camera 126. A coated amt. is estimated by a computer in accordance with the outside shape area of the spotty adhesive



subjected to image pickup and coating conditions are automatically controlled by the computer in such a manner that the coated amt. attains the adequate amt. The coated amt. of the spotty adhesive of the three-dimensional shape is exactly estimated in accordance with the image pickup result of the camera 126 which is a two-dimensional image pickup device.

---

#### LEGAL STATUS

[Date of request for examination] 15.12.1995

[Date of sending the examiner's decision of rejection] 03.06.1997

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 2863475

[Date of registration] 11.12.1998

[Number of appeal against examiner's decision of rejection] 09-11303

[Date of requesting appeal against examiner's decision of rejection] 02.07.1997

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

## [Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to detection and control of the coverage especially about the equipment which applies high viscous fluid, such as adhesives and cream-like solder, to the coated side of coated material, such as a printed circuit board.

[0002]

[Description of the Prior Art] High viscous fluid is made to breathe out the specified quantity every from a discharge tube, and there is some equipment which applies high viscous fluid and which is applied to the coated side of coated material in the shape of a spot. For example, it is made to make the adhesives as high viscous fluid held in JP,59-152689,A in the coater of a publication at the syringe breathed out from a specified quantity [ every ] discharge tube by supply of the compressed air as a pressurization gas. In this kind of high viscous fluid coater, according to a kind of high viscous fluid, a use, etc. which should be applied, application conditions are set up suitably, and it is controlled so that high viscous fluid is applied the specified quantity every.

[0003]

[Problem(s) to be Solved by the Invention] However, high viscous fluid did not restrict that the character of viscosity etc. was always fixed, but even if it set up application conditions so that it might be applied the specified quantity every, it had the problem that there may be too many coverages, or it was too few and trouble might arise in the work of a back process. Moreover, the set-up application condition itself is unsuitable and it may not succeed in an application good. In a coater given in aforementioned JP,59-152689,A Although a coater is made to breathe out multiple-times quantity viscous fluid apart from the application to coated material and it is made to lose generating of dispersion in the coverage by hardening of high viscous fluid etc. when an application stops more than fixed time during an application in advance of an application thus -- even if it carries out -- the character of high viscous fluid -- generating of the problem to which a coverage becomes unsuitable by unsuitable \*\* of change or application conditions is nonavoidable

[0004] The 1st invention of this application is made considering obtaining the high viscous fluid coater which has the function to detect correctly the coverage of high viscous fluid [ shape / of a spot ] applied in the shape of a spot by making the above situation into a background as a technical problem. The technical problem of the 2nd invention is obtaining the high viscous fluid coater which has the function which is automatic and controls the coverage of high viscous fluid [ shape / of a spot ] in a proper amount in addition to the spot-like high viscous fluid coverage detection function of the equipment concerning the 1st invention. The technical problem of the 3rd invention is applying the 2nd invention to the adhesives coater which applies the adhesives for pasting up electronic parts on a printed circuit board.

[0005]

[Means for Solving the Problem] The discharge tube by which the above-mentioned technical problem breathes out a high viscous fluid coater, and applies \*\* nose of cam to high viscous fluid to the coated

side of coated material for it in the shape of a spot in the 1st invention, \*\* In case it is prepared fixed to the discharge tube and a discharge tube and the aforementioned coated material are made to approach mutually, contact coated material ahead of the aforementioned nose of cam of a discharge tube. The stopper which specifies the crevice between the nose of cam of a discharge tube, and coated material, and the image pck-up equipment which picturizes the spot-like high viscous fluid applied to the coated side of \*\* coated material from an almost right-angled direction to a coated side, \*\* It is solved by including a coverage presumption means to presume the coverage of high viscous fluid [ shape / of the spot ] based on the appearance area of high viscous fluid / shape / of an aforementioned spot ] picturized by the image pck-up equipment.

[0006] Moreover, in the 2nd invention, it is solved by including an application condition change means to change the aforementioned setups so that the coverage of high viscous fluid presumed to be the regurgitation control unit which makes the aforementioned quantity viscous fluid breathe out from the aforementioned discharge tube further according to \*\* setups by the \*\* aforementioned coverage presumption means may become almost equal to the setting coverage set up beforehand about a high viscous fluid coater.

[0007] In the 3rd invention, the binder coater which is a kind of a high viscous fluid coater (a) Printed circuit board positioning means for supporting which position and support the printed circuit board to which two or more application positions of adhesives are beforehand set corresponding to each of two or more electronic-parts fixed positions, (b) The discharge tube which breathes out the aforementioned adhesives from a nose of cam, and is applied to the coated side of the aforementioned printed circuit board in the shape of a spot, (c) In case it is prepared fixed to the discharge tube and a discharge tube and the aforementioned printed circuit board positioning means for supporting are made to approach mutually, the coated side of the aforementioned printed circuit board is contacted ahead of the aforementioned nose of cam of a discharge tube. The stopper which specifies the nose of cam of a discharge tube, and the crevice between coated material sides, and (d) Image pck-up equipment which picturizes the spot-like adhesives applied at least to one side with the coated side of coated material with another the coated side and printed circuit board of the aforementioned printed circuit board from an almost right-angled direction to a coated side, (e) Move equipment which makes the aforementioned printed circuit board positioning means for supporting, the aforementioned discharge tube, and image pck-up equipment displaced relatively in a direction parallel to the plate surface of a printed circuit board, and the right-angled direction, (f) The regurgitation control unit which makes the aforementioned adhesives breathe out from the aforementioned discharge tube according to setups, (g) A coverage presumption means to presume the coverage of the spot-like adhesives based on the appearance area of the aforementioned spot-like adhesives picturized by the aforementioned image pck-up equipment, (h) It is solved by including an application condition change means to change the aforementioned setups so that the coverage of the adhesives presumed by the aforementioned coverage presumption means may become almost equal to the setting coverage set up beforehand.

[0008]

[An operation and effect] of the 1st invention In the high viscous fluid coater concerning the 1st invention, in case a discharge tube and coated material are made to approach mutually, a stopper contacts coated material ahead of the nose of cam of a discharge tube, and the crevice between the nose of cam of a discharge tube and coated material is specified. Since high viscous fluid is breathed out from a discharge tube in the state, high viscous fluid is applied to coated material in the always almost same 3-dimensional configuration. Therefore, good functionality is between the appearance area of high viscous fluid [ shape / of a spot ], and capacity. Image pck-up equipment shall be picturized by the coated side from an almost right-angled direction in the spot-like high viscous fluid applied to the coated side of coated material. Although the coverage presumption means is having the coverage of high viscous fluid [ shape / of the spot ] presumed based on the appearance area of high viscous fluid / shape / of a spot ] picturized by image pck-up equipment, the coverage of high viscous fluid with sufficient sufficient accuracy is detectable. According to the 1st invention, composition becomes possible [ detecting the coverage of the high viscous fluid in a high precision ] by easy and cheap image pck-up

equipment and a coverage presumption means.

[0009]

[An operation and effect] of the 2nd invention Since the high viscous fluid coater concerning the 2nd invention includes a regurgitation control unit and an application condition change means in addition to the component of the high viscous fluid coater concerning the 1st invention, based on the presumed result of high viscous fluid by the coverage presumption means, application conditions are changed by the application condition change means, and the regurgitation of high viscous fluid of a discharge tube is controlled by the regurgitation control unit according to the changed application condition. Therefore, even if the character of a high viscous fluid has a certain amount of change, a coverage will be mostly kept automatic in a proper amount.

[0010]

[An operation and effect] of the 3rd invention In the adhesives coater concerning the 3rd invention, the adhesives as high viscous fluid are applied to two or more application positions where the printed circuit board as coated material is set up beforehand in the shape of a spot, printed circuit board positioning means for supporting, a discharge tube, and image pck-up equipment being made to be displaced relatively with move equipment by a direction parallel to the plate surface of a printed circuit board, and the right-angled direction. The coverage of the spot-like adhesives applied at least to one side with the coated side of coated material with another the coated side and printed circuit board of a printed circuit board It is detected by image pck-up equipment and the coverage presumption means, and is based on the detection result. By the application condition change means, application conditions are changed for the coverage of adhesives so that it may become almost equal to the setting coverage set up beforehand, and according to the changed condition, the regurgitation of the adhesives from a discharge tube is controlled by the regurgitation control unit. When the coverage of the spot-like adhesives applied to the coated side of a printed circuit board is detected by image pck-up equipment and the coverage presumption means, even if the spot-like adhesives are for actually pasting up electronic parts on a printed circuit board, it may be applied to the portion which the electronic parts of a printed circuit board do not paste up especially for coverage detection. When the spot-like adhesives with which a coverage is detected by image pck-up equipment and the coverage presumption means are applied to the coated side of coated material with an another printed circuit board to it, especially spot-like adhesives will surely be applied for coverage detection. Since the application of adhesives is performed also in the adhesives coater concerning the 3rd invention after the crevice between the nose of cam of a discharge tube and a coated side has been correctly prescribed by the stopper, The 3-dimensional configuration of spot-like adhesives is fixed, and even if the appearance configuration of the spot-like adhesives applied to the coated side is picturized by image pck-up equipment and presumed by the coverage presumption means based on the image pck-up result, the presumed result (detection result) becomes what has a high precision. Though composition is easy, the adhesives coater which can control a coverage with a sufficient precision automatically is obtained.

[0011]

[Embodiments of the Invention] Hereafter, the adhesives coater which applies adhesives to the electronic-parts fixed part of a printed circuit board in the shape of a spot is explained in detail as an operation form common to the 1st invention or the 3rd invention based on a drawing. Drawing 3 is drawing showing the whole mechanism section of an adhesives coater, and 10 is an X-axis table which moves to X shaft orientations into the level surface in drawing. The X-axis table 10 is moved by rotating the ball thread screwed in the nut which is not illustrated by the servo motor 11 (referring to drawing 6 ). Moreover, on the X-axis table 10, the Y-axis table 12 which moves to Y shaft orientations which intersect perpendicularly with X shaft orientations in the level surface is formed. The nut 14 of fixation in it is screwed in a ball thread 16, and the Y-axis table 12 is moved by rotating a ball thread 16 by the servo motor 18.

[0012] The application unit 24 of a couple is attached in the side parallel to X shaft orientations of the Y-axis table 12 with the attachment component slack bracket 26, respectively. The frame which supports the application unit 24 is constituted, a bracket 26 is attached in the Y-axis table 12 possible [ rise and

fall ], and the Y-axis table 12 is made to go up and down, where the application unit 24 is held by the lifting device 28.

[0013] The bracket 26 accomplished L typeface, as shown in drawing 2 , and it has fitted into the guide rail 34 by which the guide block 32 prepared in the arm section 30 of one of these was formed in the Y-axis frame 12 possible [ sliding ]. It is attached in the posture in which block 36 begins to be prolonged below on the side of the Y-axis table 12, and it is attached in the front face at the sense to which a guide rail 34 extends in the vertical direction, and a bracket 26 is made to go up and down perpendicularly in the position below the Y-axis table 12.

[0014] On the above-mentioned Y-axis table 12, the gear housing 40 is being fixed so that the part may project from the aforementioned side, and as shown in drawing 4 and drawing 5 , the rack 42 is attached in the lobe possible [ movement in the vertical direction ] through the slide bearing 44 of a couple. The gearing 46 supported possible [ rotation in the gear housing 40 ] is clenched by the rack 42. While a sector gear 48 is prepared for a gearing 46 in one, another gearing 50 sets his teeth, and a rack 42 is moved by rotating this gearing 50 by the servo motor 52.

[0015] The soffit section of the above-mentioned rack 42 constitutes the shape of a yoke, as shown in drawing 2 , the rod 54 is connected, and the aforementioned bracket 26 is connected with this rod 54 with the plate 56. The end section of a plate 56 is fixed to the undersurface of the arm section 30 of a bracket 26, and the other end is energized below with the spring 60 arranged between the spring receptacles 58 prepared in the rod 54 while it fits into a rod 54 possible [ sliding ]. The plate 56 is having the ejection from a rod 54 prevented by the nut 62 screwed in the soffit section of a rod 54. A bracket 26 is made to go up and down when a plate 56 is made to go up and down in one with a rod 54 where a nut 62 is contacted. A rack 42, a gearing 46, a sector gear 48, the gearing 50, the servo motor 52, the rod 54, and the plate 56 grade constitute the lifting device 26.

[0016] In addition, although a rack 42 is made to carry out small distance descent after a bracket 26 reaches predetermined downward end position, an excessive downward distance is absorbed by compression of a spring 60. Moreover, the rise edge of a rack 42 is detected by the photoelectric switch 66 prepared in the aforementioned gear housing 40, a downward edge is detected when a plate 56 is detected by the photoelectric switch 68 (refer to drawing 3 ), and the change of a servo motor 52 etc. is performed based on the detecting signal.

[0017] It is made for the arm section 70 of another side of a bracket 26 to begun to be horizontally prolonged from the soffit section of the arm section 30, and the application unit 24 is attached in this arm section 70. As shown in drawing 1 , the tubed part material 72 has fitted into the arm section 70 possible [ rotation ] and impossible [ movement to shaft orientations ] through the sleeve 74. The tubed part material 72 sits down on a sleeve 74 in the major-diameter section 77, and is having the rotation to a sleeve 74 prevented by the pin 78 while it constitutes a \*\* with the stage and fits into a sleeve 74 in a narrow diameter portion 76. Moreover, the discharge head 82 equipped with one discharge tube 80 fits in, and it is being fixed to the soffit section which projected from the arm section 70 of the tubed part material 72 by the cap nut 86, after being made to engage with a pin 84 and preventing rotation. The stopper 88 which begins to be prolonged below is being fixed to the discharge tube 80 from the nose of cam, and it is made for a stopper 88 to arise [ a fixed crevice ] between discharge tubes 80 in contact with a printed circuit board at the time of an adhesives application.

[0018] A nut 90 is screwed in the soffit section which projected from the arm section 70, and a sleeve 74 is having movement of shaft orientations prevented on the other hand while being supported by the arm section 70 possible [ rotation ]. Moreover, the gearing 92 of a major diameter is formed in the upper-limit section of a sleeve 74. This major-diameter gearing 92 is clenched by the minor diameter gearing 94 (refer to drawing 3 ) arranged in the circumference of the axis prolonged in the vertical direction between the units 24 of a couple possible [ rotation ], and by rotating the minor diameter gearing 94 by the servo motor 96, while a sleeve 74 is rotated, the tubed part material 72 is rotated. When it is required in using the discharge head equipped with two discharge tubes 80 in order that the major-diameter gearing 92, the minor diameter gearing 94, and the servo motor 96 grade may constitute the rotation driving gear and may apply two adhesives to each 1 time to change the direction of a list of two

discharge tubes 80, the tubed part material 72 is rotated by the rotation driving gear.

[0019] Furthermore, the syringe 98 is attached in the upper-limit section of the tubed part material 72. A piston 104 fits into the interior possible [ an airtight and sliding ], and a syringe 98 grows into it while opening of the cylinder-like member 100 of an owner bottom is blockaded by the cap 102. A syringe 98 is held impossible [ movement to shaft orientations ], and impossible [ relative rotation ] by the attachment component 112 fixed on the sleeve 74 while it fits into the fitting hole 110 formed in the major-diameter section 77 of the tubed part material 72 in the fitting salient 108 of the minor diameter formed in the soffit airtightly.

[0020] An attachment component 112 constitutes the shape of a closed-end cylinder, and it is being fixed to the sleeve 74 with the bolt 114 while it fits into the tubed part material 72 and a sleeve 74 in the bottom wall. The flange 116 of the inner sense of a couple is formed in opening of an attachment component 112, it has the bore which can insert a syringe 98 by that cause, and the opening 118 which has the notch which reaches the peripheral wall of an attachment component 112, respectively in two places which were far apart in the diameter direction is formed. The engagement salient 120 which begins to be prolonged outward, respectively is formed in two places which were far apart in the diameter direction of the lower part of a syringe 98. By rotating a syringe 98, after making the syringe 98 insert in an attachment component 112 after the phase of this and a notch of opening 118 has agreed and making the fitting salient 108 fit into the fitting hole 110 While the engagement salient 120 engages with a flange 116 and has movement of shaft orientations prevented, it will be held where relative rotation is prevented by friction produced in the contact surface with a flange 116.

[0021] In addition, the medial surface (inferior surface of tongue) of a flange 116 is made into the inclined plane which inclines in the sense close to the bottom wall of an attachment component 112 as it goes to an another side side from one hoop-direction side, and a syringe 98 is forced on the tubed part material 72 along with rotation.

[0022] Furthermore, the hose 122 connected to the compressed-air source of supply which is not illustrated is connected to the cap 102 of a syringe 98 by splicing fitting 124. a hose 122 -- on the way -- being alike -- electromagnetism -- the directional selecting valve 125 (refer to drawing 6 ) is formed, and a syringe 98 is alternatively made open for free passage by a compressed-air source of supply and the atmosphere by the change of the change-over valve 125 By supplying the compressed air to a syringe 98, a piston 104 is dropped and adhesives are breathed out the specified quantity every through a discharge tube 80 by the path row formed in the tubed part material 72 and the discharge head 82.

[0023] As shown in this adhesives coater at drawing 3 , the camera 126 which reads the reference mark prepared in the printed circuit board is attached in the position which adjoins the application unit 24 of the Y-axis table 12. A camera 126 is equipped with the lens held by the maintenance cylinder 127, and the reference mark is made for the projector 128 formed in the lower part to be irradiated at the time of an image pck-up. ON light of the reflected light from the reference mark by irradiation of a projector 128 is carried out to a lens, and while the image corresponding to the appearance of a reference mark is formed on the solid state image pickup device of a camera 126, the image is changed and outputted to a signal. The adhesives application position is set up on the basis of the reference mark, and read of a reference mark is performed in advance of the application of adhesives. Based on the read result, correction of the movement magnitude of tables 10 and 12 is made, and the application unit 24 is moved with a sufficient precision on the adhesives application position of a printed circuit board.

[0024] In addition, although illustration is omitted, under the adhesives coater, printed circuit board positioning means for supporting are prepared, a printed circuit board is conveyed by carrying-in equipment, and after positioning support has been carried out by positioning means for supporting, the application of adhesives is performed, and it is conveyed by the following process with taking-out equipment after an application.

[0025] The adhesives coater constituted as mentioned above is controlled by the computer 130 shown in drawing 6 . The computer 130 is equipped with CPU (central processing unit)132, ROM (read-only memory)134, and RAM (RAM)136, and when abnormalities occur through I/O Port 138 at the mechanism section of an input unit 140, the operation start switch 142, a safety switch 144, and an



adhesives coater in these [ CPU132, ROM134, and RAM136 ], the unusual annunciator 146 which reports the abnormality is connected.

[0026] An input unit 140 The number of times N1 and (it sets in this operation form and is 3 times) the number of times N2 (in this operation form) which, and is tried and struck of reserve \*\*\*\* of adhesives Three \*\* and a position, the position of a regular application, and a severalNs application part 3, the criteria coverage of adhesives (shown by the appearance area of the plane view of the spot-like adhesives which adhered to the printed circuit board by \*\*\*\* in this operation form), Although judged, whether the adhesives applied by this coater by the operation interval in the case of performing the compressed-air supply time, reserve \*\*\*\*, and trial \*\*\*\* to a syringe 98 two or more times, discontinuation of an application, etc. hardened, and reserve \*\*\*\* is needed the required halt conventional time T0 etc. -- it is for inputting

[0027] Reserve \*\*\*\* is \*\*\*\* for removing the hardened adhesives and \*\*\*\* being performed normally, when the adhesives in a syringe 98 harden, and trial \*\*\*\* is \*\*\*\* performed in order that \*\*\*\* may measure the coverage of spot-like adhesives in the state where it is carried out normally and may set up \*\*\*\* conditions. moreover, this operation form -- setting -- a reserve \*\*\*\* row -- trying -- striking -- it shall separate from the electronic-parts fixed position on a printed circuit board, and shall carry out on a straight line parallel to X shaft orientations in the position which is unrelated to wiring Moreover, it is expressed with XY coordinate set up reserve \*\*\*\* of adhesives, and on the basis of the reference mark which is tried and struck, and by which each regular position of an application was established in the printed circuit board.

[0028] the above CPU132, ROM134, and RAM136 -- further -- the servo motor drive circuits 150, 152, 154, and 155 and electromagnetism -- the directional-selecting-valve control circuit 156 and the camera drive circuit 158 -- minding -- the servo motor 11 respectively for an X-axis table drive, the servo motor 18 for a Y-axis table drive, the servo motor 52 of a lifting device 28, the servo motor 96 for tubed part material rotation, and electromagnetism -- a directional selecting valve 125, a camera 126, printed circuit board carrying-in equipment, positioning means for supporting, taking-out equipment, etc.

[0029] A timer 164 is formed in CPU132. moreover, to RAM136 the number-of-times counter 166 of reserve \*\*\*\* -- trying -- striking -- the number-of-times counter 168, the number-of-times counter 170 of a regular application, and F1 -F3 flags 172, 174, and 176 and the reserve \*\*\*\* information memory 180 -- trying -- striking -- the information memory 182, the regular application information memory 184, and the criteria coverage memory 186 -- the compressed-air supply time memory 188 and reserve \*\*\*\*- trying -- striking -- the number-of-times memory 190 of operation -- it reserve-\*\*\*\*, tries, and strikes and the appearance area of the adhesives of the shape of the operation interval memory 192, the stop-time memory 194, and a spot tried, struck and carried out is memorized -- it tries and strikes and the area memory 196 is formed Furthermore, the program shown with a flow chart is memorized by ROM134 at drawing 7 , and CPU132 controls the application of adhesives according to this program. the flow chart of the following and drawing 7 -- being based -- reserve \*\*\*\* of adhesives -- it tries and strikes and a regular application is explained

[0030] Simultaneously with powering on to equipment, it is Step S1 (it is hereafter written as S1.). the same is said of other steps setting -- counters 166-170 -- each -- number-of-counts C1 -C3 While being referred to as 0 and resetting flags 172-176, initial setting which sets to 0 number-of-counts n which shows the number of times of operation which is performed about the printed circuit board of one sheet, and which reserve-\*\*\*\*, tries and is struck is performed, and the input of the information by the input unit 140 is performed in S2. The inputted data are memorized by the predetermined memory 180-188,192,194. Both the number of times and regurgitation positions of reserve \*\*\*\* shall be memorized by the reserve \*\*\*\* information memory 180.

[0031] It tries and strikes, and the same will be said of the regular application, and a regurgitation position will be inputted in order of the regurgitation, and the number of counts of a counter will specify the power regurgitation position data to read. The number of counts 0 specifies the data about the 1st regurgitation position. This input is completed, if the completion data of an input are inputted, the judgment result of S3 will serve as YES, read of a reference mark is performed in S4, and reserve \*\*\*\*



of adhesives is first performed in less than [ S5 ].

[0032] It sets to S5 and is F1. It is F1, unless reserve \*\*\*\* of adhesives is completed, although the judgment of whether a flag 172 is OFF is performed. A flag 172 is not set, but the judgment result of S5 serves as YES, and the table move information for reserve \*\*\*\* is read in S6. After correction is added based on the position of the reference mark which the position data which perform reserve \*\*\*\* first were read, and was read to this position data in S4, in S7, the X-axis table 10 and the Y-axis table 12 are moved, and it is moved so that the discharge tube 80 of the application unit 24 of the direction with which a regular application is presented among the application units 24 of a couple may be located right above a reserve \*\*\*\* position.

[0033] Then, the application of adhesives is performed in S8. A servo motor 52 is started and the application unit 24 held at the bracket 26 is dropped by moving a rack 42. Although a rack 42 is made to carry out small distance movement after a stopper 88 contacts a printed circuit board, the movement is permitted by compression of a spring 60, and the interval of a discharge tube 80 and a printed circuit board is kept constant, breakage of a stopper 88 and a printed circuit board being avoided.

[0034] if the application unit 24 moves to a downward position, a servo motor 52 will stop -- having -- electromagnetism -- a directional selecting valve 125 is switched and the compressed air is supplied to a syringe 98 if a piston 104 is dropped by that cause, and adhesives are breathed out, it is applied to a printed circuit board in the shape of a spot and time supply of predetermined is carried out for the compressed air -- electromagnetism -- while a directional selecting valve 125 is switched, a syringe 98 is made open for free passage by the atmosphere and the regurgitation of adhesives is stopped, a servo motor 52 is started and the application unit 24 is raised

[0035] Subsequently, it sets to S9 and is F2. Although the judgment of whether a flag 174 is OFF is performed, this judgment result is YES, and it sets to S10, and is the number of counts C1 of a counter 166. After carrying out 1 \*\*\*\*, it sets to S11, and it is C1. Although the judgment of whether to be more than N1 (here 3) is performed, this judgment result is NO and program execution returns to S5 at the beginning. Then, the 2nd reserve \*\*\*\* position is read in S6, hereafter, S5-S11 are repeatedly performed until the judgment result of S11 serves as YES, and reserve \*\*\*\* is performed. It is N1, even if time got down from the last application performed using this adhesives coater earnestly by that cause and the situation where adhesives are the outlets of a discharge tube 80 and where it has solidified the grade has arisen. This lump section will be removed by reserve \*\*\*\* of a time, and the regurgitation will be performed normally.

[0036] Trial \*\*\*\* is performed after reserve \*\*\*\* is performed as mentioned above. Reserve \*\*\*\* is N1. If the judgment result of \*\*\*\*\* S11 serves as YES, it will set to S12, and it is F1 and F2. Although program execution returns to S5 after a flag 172, 174 is set to ON, this judgment result serves as NO, the judgment result of Scontinuing 13 is YES, and while the 1st position tried and struck is read in S14, the correction based on the position error of a reference mark is added. Subsequently, the application unit 24 with which reserve \*\*\*\* was presented in S7 is moved, the discharge tube 80 tries and strikes, and it is located right above a position.

[0037] And although adhesives are breathed out in S8, the judgment result of continuing S9 is NO, the judgment result of S15 is YES and S16 is performed. the X-axis table 10 and the Y-axis table 12 make it move in S16 -- having -- a camera 126 -- trying -- striking -- it is moved right above the adhesives of the shape of an applied spot Movement in this case picturizes the spot-like adhesives which were read in S14 and which tried, and struck and it succeeded based on the move information on business, and tried and struck the camera 126, were carried out, and adhered to the printed circuit board. The image of the appearance of the plane view of adhesives is tied on a solid-state-image-pickup-device side, is changed into a binarization signal, and is outputted to a computer 130. The appearance area of the adhesives of the shape of a spot picturized in the operation part of a computer 130 by that cause is computed, it tries and strikes, and the area memory 196 memorizes.

[0038] Then, it sets to S17 and is the number of counts C2 of a counter 168. Although 1 \*\*\*\* is carried out and the judgment of whether the number of counts is more than N2 (here 3) is performed in S18, the judgment result is NO at first, and program execution returns to S5.

[0039] until the judgment result of S18 serves as YES hereafter -- S5 and S -- 13, 14, S7 - S9, and S15-S18 are performed repeatedly And trial \*\*\*\* is N2. If a \*\*\*\* crack and the judgment result of S18 serve as YES, while the average of the appearance area of the adhesives of 3 times of the shape of a spot which tried and struck and was picturized by \*\*, respectively will be computed in S19, the average is compared with the reference value set up beforehand, and the supply time of the compressed air to a syringe 98 is corrected so that a coverage may serve as a reference value.

[0040] Compressed-air supply time is shortened so that there may be too much discharge quantity if the average is larger than a reference value, and the amount may decrease, and if the average is smaller than a reference value, compressed-air supply time will be lengthened. a certain amount of [ a reference value ] width of face -- with, although set up, it is connected with the adhesives applied adjacently, or is made for coverages not to run short, even if the compressed-air supply time which is set up in the comparatively narrow range between the maximum coverages and the minimum coverages which are permitted, and is set up by one correction is not in agreement with the time when a criteria coverage is obtained Thus, after correction of compressed-air supply time is made, it sets to S20, and it is F3. A flag 176 is set to ON and program execution returns to S5.

[0041] The judgment result of S5 is NO, the judgment result of S13 also serves as NO, S21 is performed, and the regular table move information for an application is read. First, while the information on the position which applies adhesives first is read, the correction based on a reference-mark position error is added, the application unit 24 to which it tried in S7 continuously, and \*\*\*\* was performed is moved, and an application is performed in S8. NO and the judgment result of S15 are also NO(s), it sets to S22, and the judgment result of S9 is the number of counts C3 of a counter 170. After carrying out 1 \*\*\*\*, the judgment of whether the unusual signal or the stop signal is taken out in S23 is performed. If there are no abnormalities in the mechanism section of a coater and a safety switch 144 is not operated, either, this judgment result is NO and it sets to S24, and it is C3. Although the judgment of whether to be more than the total of N3, i.e., an adhesion application position, is performed, this judgment result is NO and program execution returns to S5.

[0042] Hereafter, S5, S13, S21, S7 - S9, and S15, S22-S24 are repeatedly performed until the judgment result of S24 serves as YES. When a certain abnormalities occur in the mechanism section of an adhesives coater, and an unusual signal is emitted or a safety switch 144 is operated in the meantime, the judgment result of S23 serves as YES, and the operation of equipment is suspended in S30.

Subsequently, after number-of-counts T of a timer 164 is made to carry out 1 \*\*\*\* in S31, the judgment of whether whether a halt having been canceled in S32 and the operation start switch 142 were operated is performed.

[0043] until the judgment result of S32 serves as YES -- S -- 31 and 32 are performed repeatedly and a stop time is measured by the timer 164 A halt is canceled, if an application is resumed, the judgment result of S32 will serve as YES, and it sets to S33, and a stop time T is the halt conventional time T0. A large judgment is performed. When a stop time is short, the judgment result of S33 serves as NO, program execution returns to S23 and an application is performed from the next position of the position where the application was performed at the time of a halt.

[0044] Moreover, a stop time is long, when the judgment result of S33 is set to YES, S34 is performed, and it is F1 -F3. Flags 172-176 are turned OFF and it is C1 and C2. While being made 0, A is added to all the values of the X coordinate which specifies reserve \*\*\*\* and the position tried and struck, and further, it reserve-\*\*\*\*, tries, and strikes, and the number of times n of operation is set to 1. Therefore, when less than [ S5 ] is performed next, S5, S9, and the judgment result of S13 and S15 serve as YES, it tries on a reserve \*\*\*\* row again, and \*\*\*\* is performed. Moreover, since A is added to the value of reserve \*\*\*\* and the X coordinate which tries and strikes and specifies the table move position at the time, in the position which only distance A separated from the last reserve \*\*\*\* and the trial position in in X shaft orientations, there is nothing with the adhesives and the heavy bird clapper which were applied last time, and reserve \*\*\*\* and trial \*\*\*\* will be performed.

[0045] and a regular application will be resumed, if predetermined is performed for reserve \*\*\*\* and trial \*\*\*\* the number of times every and compressed-air supply time is corrected Since the counter 170

is not reset, an application is performed from the position of a degree applied before discontinuation. [0046] Although the judgment of whether the judgment result of S24 was set to YES, and the application work to the printed circuit board of a constant was beforehand completed in S25 will be performed if adhesives are applied to all the electronic-parts fixed parts of the printed circuit board of one sheet, this judgment result is NO at the beginning. Therefore, it sets to S26 and is F3. A flag 176 is reset and it is C2 and C3. While being referred to as 0 After the value of reserve \*\*\*\* and the X coordinate which tries and strikes and specifies the table move position of business is returned to the value at the time of a move information input, n is set to 0 in S27, program execution returns to S5, and tries and strikes about the printed circuit board conveyed next, and a regular application is performed. It tries for every one printed circuit board, and \*\*\*\* is performed.

[0047] If the application of adhesives to the printed circuit board of predetermined number of sheets is completed, the judgment result of S25 will serve as YES. It sets to S28 and is F1 -F3. Flags 172-176 are reset and it is C1 -C3. While being referred to as 0, after the value of the X coordinate of regurgitation position data is similarly returned in S26, program execution is ended n being used as 0 in S29.

[0048] Thus, since it tries in advance of the regular adhesives application to a printed circuit board, \*\*\*\* is performed and the compressed-air supply time to a syringe 98 is corrected based on the result according to the adhesives coater of this operation gestalt, the adhesives which adhesives are applied too much and adjoin stand in a row, poor wiring arises or the effect that it is lost that a coverage is insufficient and trouble arises in fixation of electronic parts is acquired.

[0049] Moreover, since it precedes trying and striking and reserve \*\*\*\* is performed, it tries on the state where adhesives are breathed out normally and \*\*\*\* is performed, even if the adhesives in a syringe 98 have become hard to some extent, compressed-air supply time can be set more as accuracy by measuring the coverage of the adhesives of the shape of a spot breathed out in the same state as the case where it is not influenced [ the ] and a regular application is performed.

[0050] Furthermore, since reserve \*\*\*\* and trial \*\*\*\* are performed when a regular adhesives application is interrupted more than fixed time, the effect that it is lost that dispersion arises in a coverage by discontinuation of an application is acquired.

[0051] It sets in this operation gestalt so that clearly from the above explanation. S16-S18, and S20, [ in / the flow chart of drawing 7 of a computer 130 / a camera 126 constitutes image pck-up equipment and ] The portion which computes the average of the appearance area of the adhesives of the shape of a spot of S19 as a numeric value showing a coverage constitutes a coverage presumption means. The portion which corrects compressed-air supply time so that the average and the reference value which were computed of S19 may be compared and a coverage (average) may serve as a reference value constitutes the application condition change means. moreover, the portion which performs S8 in the flow chart of drawing 7 of a computer 130 and electromagnetism -- the directional selecting valve 125 constitutes the regurgitation control unit Moreover, the X-axis table 10, the servo motor 11, the Y-axis table 12, the servo motor 18, and the lifting-device 28 grade constitute the move equipment which makes printed circuit board positioning means for supporting, a coater, and image pck-up equipment displaced relatively in a direction parallel to the plate surface of a printed circuit board, and the right-angled direction.

[0052] In addition, in the printed circuit board of one sheet, when there are many adhesives application parts, it tries on the way and may be made for it to be made to carry out every two or more sheets, and to perform \*\*\*\* in the above-mentioned operation gestalt, although it tries for every one printed circuit board and \*\*\*\* is performed. moreover -- trying -- striking -- it tries not only in a printed circuit board, strikes, and may be made to carry out to another members, such as a member of exclusive use

[0053] Another operation form of this invention is shown in drawing 8 and drawing 9 . This operation form measures the coverage of adhesives for every application of the number of times of fixed at the time of a regular application, and when a coverage is unsuitable, it changes application conditions. In this operation form, as shown in drawing 8 , the total number-of-times counter 200 of an application, the number-of-times counter 202 of measurement, the number-of-times counter 204 of an application, the flag 206 for coverage measurement, the application information memory 208, the criteria coverage

memory 210, the permission coverage memory 212, the compressed-air supply time memory 214, the application area memory 216, the number-of-times memory 218 of measurement, and the number-of-times memory 220 of an application are formed in RAM136 of a computer 130. The total number-of-times counter 200 of an application counts all the number of times of an application to the printed circuit board of one sheet, the number-of-times counter 202 of measurement counts the number of times of measurement of the coverage of adhesives, and the number-of-times counter 204 of an application counts the number of times of an application to which measurement of a coverage is not performed. The application information memory 208 is the same as the aforementioned regular application information memory 184, and the total number of times alpha of an application and an application position are memorized. what has the criteria coverage memory 210 the same as the aforementioned criteria coverage memory 186 -- it is -- the fixed range -- with, the maximum and the minimum value of a criteria coverage which are defined are memorized Moreover, the permission coverage memory 212 memorizes the amount of upper limits and the amount of minimums of adhesives required to fix electronic parts to a printed circuit board, and a permission peak and the permission minimum amount are set up in the range larger than a criteria coverage. It is the same as the aforementioned compressed-air supply time memory 188, and the aforementioned trial of the application area memory 216 is carried out, it is struck, and that of the compressed-air supply time memory 214 is the same as the area memory 196. Furthermore, the number of times beta which measures a coverage in the number-of-times memory 218 of measurement is memorized, and the number of times gamma of an application to which the number-of-times memory 220 of an application does not measure a coverage is memorized. Moreover, the flow chart shown in drawing 9 is memorized by ROM134, and the application of adhesives is hereafter explained to it based on this flow chart.

[0054] S101-S107 are the same as the above S1 - S4, and S21, S7 and S8, the X-axis table 10 and the Y-axis table 12 are moved based on the table information memorized by the application information memory 208, and adhesives are applied to a position one by one. After applying to one place, it sets to S108, and it is number-of-counts CT of the total number-of-times counter 200 of an application. 1 \*\*\*\* is carried out, and subsequently to S109 it sets, and is CT. Although the judgment of whether to be more than the total number of times alpha of an application is performed, this judgment result is NO at the beginning, and the judgment of whether the flag 206 for coverage measurement is set in S110 is performed. 206 is set in initial setting in a flagS101, it is YES, and appearance area is computed and this judgment result is memorized by the application area memory 216 while the adhesives which the camera 126 was similarly moved in the above S16 in S111, and were applied are picturized.

[0055] Then, it sets to S112 and is the number of counts Cn of the number-of-times counter 202 of measurement. After carrying out 1 \*\*\*\*, it sets to S113, and it is Cn. The judgment of whether to be more than the number of times beta of measurement is performed. This judgment result is NO at the beginning, and program execution returns to S105. Hereafter, S105-S113 are repeatedly performed until the judgment result of S113 serves as YES. After the average of the adhesives application area by which measurement of a coverage was measured in S114 if the number-of-times line crack of predetermined and the judgment result of S113 were set to YES is computed, in S115, the judgment with the larger average than the maximum of a permission coverage is performed. The printed circuit board to which the adhesives of more amounts than a permission peak were applied is unsuitable as a product, and it is not necessary to apply adhesives continuously, alarm is emitted in S117, and it is reported to an operator that abnormalities arose in the coverage of adhesives. An operator will make correction of suitable processing, i.e., abandonment of the printed circuit board, and the supply time of the compressed air etc. based on this information.

[0056] If an operator completes those processings, he will input completion, the judgment result of S118 serves as YES by that cause, program execution returns to S105 and the application of the adhesives to the following printed circuit board is started. On the other hand, when the average of a coverage is smaller than the maximum of a permission coverage, the judgment result of S115 serves as NO, and a judgment smaller than the minimum value of a permission coverage is performed in S116. When small, the judgment result of S116 serves as YES, S117 and S118 are performed like the above-mentioned

case, when large, the coverage of adhesives will be in tolerance and S119 is performed.

[0057] In S119, when large, while the judgment with the larger average of a coverage than the maximum of the criteria range was performed, and the supply time of the compressed air was shortened in S121, after the content of memory 214 is rewritten in S122, S123 is performed, the number-of-times counter 218 of measurement and the flag 206 for the number of times of measurement are reset, and program execution returns to S105. Moreover, when the judgment result of S119 is NO, S120 is performed, and the judgment with the average smaller than the minimum value of the criteria range is performed. When small, after supply time of the compressed air was lengthened in S124, a coverage will be in criteria within the limits to the content of memory 214 being rewritten in S122 when large, correction of the supply time of the compressed air is not made but S123 is performed, program execution returns to S105.

[0058] Next, when S110 is performed, the judgment result serves as NO, S125 is performed, and it is the number of counts CN of the number-of-times counter 204 of an application. After 1 \*\*\*\* is carried out, it sets to S126, and it is CN. The judgment of whether to be more than the number of times gamma of an application is performed. This judgment result is NO at the beginning, it returns to S105, the application of adhesives continues, and program execution is performed. Hereafter, S105-S110, and S125 and S126 are repeatedly performed until the judgment result of S126 serves as YES. After the flag 206 for measurement will be set while S127 was performed and the counter 204 was cleared if gamma \*\*\*\* crack and the judgment result of S126 were set to YES by the application of adhesives, program execution returns to S105. Next, if required while the judgment result serves as YES, S111-S124 are performed and an adhesives coverage is measured, when S110 is performed, the supply time of the compressed air will be corrected.

[0059] And although the judgment of whether S129 was performed and the application work to the printed circuit board of a constant was completed beforehand is performed after a flag 206 is set, while the judgment result of S109 was set to YES and the counter 200,202,204 was cleared in S128, if alpha time adhesives were applied to the printed circuit board of one sheet, this judgment result is NO at the beginning. Therefore, program execution returns to S105 and the application of adhesives is performed about the printed circuit board conveyed next. If the application of adhesives to the printed circuit board of schedule number of sheets is completed, the judgment result of S129 will serve as YES, and program execution is ended.

[0060] Thus, in this operation form, since measurement of a coverage is performed at the time of the regular application of adhesives to a printed circuit board, and compressed-air supply time is corrected based on the measurement result when required, an adhesives coverage is always maintained at a proper quantity. Especially, in order to measure a coverage in this operation form at the time of an application start, when a coverage is not suitable, it can be coped with early, and adhesives are applied vainly or it is avoided that the printed circuit board by which much adhesives besides a basis were applied to the place arises. Moreover, since it is reported to an operator and suitable processing is performed when the coverage of adhesives exceeds tolerance, it is avoided that it is mixed with a standard item and a defective is made etc.

[0061] In addition, although a coverage is measured for every application of the number of times of fixed about the printed circuit board of one sheet, you may make it measure a coverage for every application in this operation gestalt each time. Moreover, although it measures two or more times, and an average coverage is calculated and being compared with a permission coverage and a criteria coverage, you may make it measure with a permission coverage and a criteria coverage the coverage obtained by one measurement. Furthermore, also in this operation gestalt, you may be made to perform reserve \*\*\*\* and trial \*\*\*\* like the aforementioned operation gestalt.

[0062] Moreover, although the coverage of adhesives is made to be changed by adjusting the supply time of the compressed air to a syringe 98, the pressure of the compressed air or the temperature of adhesives may be adjusted, or you may make it change a coverage with those combination in each above-mentioned operation gestalt.

[0063] Moreover, you may make it picturize the image of the applied adhesives not only by the camera

126 but by other meanses. If it furthermore adds, this invention is applicable also to equipments other than an adhesives coater, such as equipment which applies cream-like solder to a printed circuit board. In addition, this invention can be carried out in the mode which gave various deformation and improvement based on this contractor's knowledge, without deviating from a claim.

---

[Translation done.]